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Biogeography Synopsis 7: Patagonian Weather Influenced by Volcanoes
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On May 8, 2008 Chaitén volcano in central Chile erupted for the first time in recorded history. [Scientific American Online, 2008] It joined at least two other South American volcanoes in becoming active over the last few months. Patagonia is one of the areas of the world with the most vulcanism. This is because the southwest coast of South America is the site of the convergence between an oceanic plate, The Nazca, and the continental South American plate. In continental-oceanic convergent tectonics the ocean crust is denser and so subducts under the lighter continental mass. When the Nazca dives under the South American plate magma from the aenesphere is forced up through the lithosphere and vents to the surface under extreme pressure as lava, or molten rock, accompanied by gases, ash, smoke, steam and rock fragments. [USGS, 2008]

The violent Chaitén eruption characteristic of subduction vulcanism jetted a dense, poisonous column 12 miles into the ionosphere. It rained rock and ash and emitted bolts of lightning. [Smith, 2008] Observers were unsure if the thunderstorm coincided with or was generated by the eruption but lightning researchers using radio waves to study volcanic eruptions report that these storms are likely caused by static electricity from collisions of rock fragments that set in motion an electrical thunderstorm. [National Geographic News, 2008]

Longer term, larger scale effects may include those induced by reduction of sunlight from the ashy haze and increased carbon dioxide in the atmosphere. Since the prevailing wind over Patagonia is northeasterly there could be damage to Argentinian crops and forests.

It is unclear whether the eruption will have a detrimental or enervating effect on stands of Northofagus trees distributed near the timberline in south central Chile. This evergreen conifer species demonstrates a kinetic model of succession dependent upon catastrophic disturbance for regeneration. Since it is both shade intolerant and has a stable canopy these eruptions may provoke a near term die-off which allows for a later phase of accelerated reproduction. [Veblen, 1979] However, since disturbed landscapes show greater vulnerability to invasion by introduced species it won't be clear for many years whether these stands will benefit from volcanic-induced changes to the local weather or not.

On Archaean earth 1900 mya, vulcanism was a dominant force. As life appeared there was great dynamism between minerals and electromagnetism. Earth's atmosphere, probably predominantly carbon dioxide and water, was created in these interactions. Volcanoes appear to erupt in the same manner throughout our solar system. Observations of weather surrounding Chaitén and other volcanoes active today provide a view into weather patterns existent elsewhere in the solar system and prevalent as life began on our Earth.

Citations

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